First International Conference on Quality of Life in Cities – Issues and Perspectives
4-6 March 1998, Singapore

Competence as a Prerequisite for the Attainment of Life Quality

Bernhard Bierschenk
Barbara Marker

Lund University, Sweden
Copenhagen Competence Research Centre,
University of Copenhagen

Abstract

This paper describes differences between the capacity of Swedish and Danish students to attain life quality. This was carried out by examining the level of competence in four different groups of Swedish and Danish students, and is based on the hypothesis that the possession of competence is a premise for the development of life quality. *Competence* means the ability to make sense in complex situations; more concretely it is the quality on the basis of which the individual activates his or her knowledge base and co-ordinates his or her actions. This definition implies that competence is a synthesis of perception and action, both of which can be detected and studied. The test method used in the present experiment involve the individual's perception of information, adaptation and preference between three different model societies, projected via series of slides. An account will be given of the individual's ability to pay attention to the phenomenon of self-recognition within these societies. The paper demonstrates that purposeful adaptation and preference in judgement give certain clues to the mental states of the participating students. The result of the examination was remarkable. For the first time in twenty years of using the same test method, the scores of a participating group vary considerably from the norms. Values which normally turn out positive were instead negative. The experiment reveals that a sample of Danish students was incapable of distinguishing between different used models in the test material. At the present time according to our test method they are incompetent.

Central concepts

We assume that *competitiveness* and *success* are the bases upon which competence is developed, and that competence is a premise for the attainment of life quality. We demonstrate that both factors (competitiveness and success) differentiate between competent and incompetent conduct. We define *competence* as the individual's ability to make sense of complex situations which are characterised by a huge flow of possibly relevant information. Our focus is at the abstract, or information processing, level. In the present context competence relates to the interaction between the mechanism of perception and the formation of response patterns in the form of preferences for certain societal developments, represented by model societies. Previously it has been shown, that these preference patterns convey the contingencies that are associated with optical display of civilian development (B. Bierschenk, 1997b).

The central concepts used in the present paper are the psychometric constructs, developed by B. Bierschenk (1997a), of *Eigen-value* (self-worth) and *visibility of social texture*. Both factors are fundamental for competition and success and both factors have been shown to be of import in exposing the individual (via exposure to the model societies) to differences in life conditions and in the expression of the individual's potential to adapt to those differences (the level of competence).

It is now generally accepted that variations in individuation and selection, resulting from variations in the environment, as well as the co-variation and interaction between individuation and environment, give rise to diversity in behaviour and consequently to the development of differences in civilisation. Further, it is no longer taken for granted that genetic recombination is the cause of qualitative leaps in behavioural evolution (Royce & Mos, 1979). Against this background there are sufficient indications that mentality is something that is formed and translated independent of learned activities and cultural polish. Cultural determinants do not appear strong enough to delete mental states arising from historical events; these states still exist, even if they diverge from contemporary culture and socialisation. See for example (B. Bierschenk, 1993 and Bierschenk & Bierschenk, 1987) who discover the existence of a linguistic “limes” in the translation of a Latin text, the limes being defined by historic events and not by cultural interaction in the present century.

Method

The study was based on three groups of Danish and Swedish students. The Swedish sample (n = 107), considered as a reference group, consisted of gymnasium students from Lund. Data from this group were collected by Inger Bierschenk in February and May 1997, and the study subsequently published (B. Bierschenk, 1997a; I. Bierschenk, 1997). The second group (n = 21) comprised Danish third year students of psychology at the University of Copenhagen; this experiment was carried out in October 1997 by Ole Elstrup Rasmussen. The third group (n = 36) consisted of Danish third year gymnasium students from Copenhagen. Mette Avnshoj collected the data on this group in October 1997. In later statistical calculations, for which groups of equal size were necessary, 20 students from each group were picked out by random selection. A gymnasium in Scandinavia offers three years of study that gives access to university or other institutes of higher education. Students in their third year at gymnasium are 18-19 years old. About a third of the total number of school leavers in Denmark and Sweden go on to gymnasium after complete ninth or tenth grade at the elementary school.

The test material consisted of three audio-visual slide series presenting different societies by means of sequences of episodes modelling versions of modern life and citizenship. These sequences refer to “Projections for the Future”, produced commercially by the Biological Science Curriculum Study of Boulder, CO, in co-operation with Crystal Productions of Seattle, CA. The model societies promote to various degrees *individuation* and *selection* (Ghiselin, 1981). For a more detailed description of the content, see Elstrup Rasmussen's contribution to this conference. According to the abbreviated guide to “Projections for the Future” (Lee & Mayer, 1976), the programs have been designed to introduce viewers to contemporary concerns that have both “scientific” and “societal” dimensions. These ideas have previously been investigated by B. Bierschenk (1987, 1988a&b, and 1997a). The three models comprise the behaviour, a humanist and a growth model. Each model is maintained to build upon a known mode of thought: behaviourism, specified by means of stimulus-response associations, gestalt theory, specified as development through part-whole restructuring, and

cybernetics, specified as development through simple value controlled feed-back mechanisms (Elstrup Rasmussen, 1997). The following instructions and markers of competition and success have been replicated throughout the last twenty years (B. Bierschenk, 1997a):

> *You will be shown a picture series on video presenting a vision of a modern society where current trends have been allowed to progress even further. It is intended to give you the opportunity of imagining yourself as part of this society. You are asked to try and picture yourself in this society in such a way that you can form a clear conception of basic conditions, which would influence your life, if you were to live there.*
> *After the display, you will be asked to give an account of your situation within the society depicted. You are to evaluate a number of statements about life there. In your assessment you may want to keep in mind some events or characteristics you find worth of serious consideration. You can do this by indicating how true or untrue you think each statement is with regard to the society by giving it a grade from 0 to 9. If you think it is "very certain" you should give it a 9, whereas if you think it is "not at all certain", indicate this by giving the statement a grade of 0.*
> *The degree of truth in each statement can be expected to vary, so don't hesitate to use the entire scale from 0 to 9.*
> *Please complete your assessment fairly quickly. Try and keep up a good pace, but don't leave anything out. Avoid making unnecessary corrections.*
>
> ***A.*** *I am able to travel both within the country and abroad as I please*
> ***B.*** *I can direct my development on my own premises.*
> ***C.*** *My right to privacy is guaranteed.*
> ***D.*** *I can participate freely in organised opposition to those in power.*
> ***E.*** *I can deal with the various aspects of my overall situation without undergoing undue stress.*
> ***F.*** *I have the possibility of adapting my life to major changes in society.*
> ***G.*** *I can choose the job I wish.*
> ***H.*** *I can do whatever I like, as long as I do not infringe upon the rights of others.*
> ***I.*** *I can make an active contribution to the re-evaluation of accepted morality.*
> ***J.*** *I can obtain the education best suited to me.*
> ***K.*** *I encounter new technical solutions in my everyday life.*
> ***L.*** *My position in society depends upon the educational system.*
> ***M.*** *My health depends upon society's technological development.*
> ***N.*** *I can realise all my material desires.*
> ***O.*** *My status in the society depends upon my education.*

Results

To investigate the variation in the sample, we used a two-by-two analysis of variance (ANOVA) that takes both Denmark and Sweden into consideration. This procedure allows experimental separation of the effects on a particular factor of respectively competence and environment, because it is possible to code operationally and to investigate the particular components of competence: *eigen-value* (Factor I) and *visibility of social texture* (Factor II).

Table 1 gives an account of the degree to which the groups in the present study reproduced the factor structure achieved with this test during the last twenty years of research. A measure of reliability is the *intra-class correlation coefficient*, which in particular takes the influence of errors into consideration. It has already been estimated in (B. Bierschenk, 1997a) and shows for Factor I a correlation value of (r_i = .99) and for Factor II the value is (r_i = .95). The calculations were carried out using Minitab inc. (1996). This indicates a high correlation and stability in the factor structure and reveals that the Danish gymnasium students deviate remarkably from the rest of the sample.

Table 1.

Reproduced factor structure of markers (FI and FII) of competition and success

	Swedish Gymnasium (n=107) Observations: 428		**Danish University** (n=21) Observations:84		**Danish Gymnasium** (n=36) Observations:144	
Item	Factor I	Factor II	Factor I	Factor II	Factor I	Factor II
A	.80	*	.85	*	.84	*
B	.85		.90		.86	
C	.82		.86		.75	
D	.86		.86		.82	
E	.63		.45		.41	
F	.69		.67		.71	
G	.81		.68		.58	
H	.80		.63		.68	
I	.80		.80		.70	
J	.77		.70		.63	
K	*	.79	*	.49	*	-.46
L		.55		.86		-.90
M		.74		.58		-.41
N		.59		.42		*
O		New		.80		-.79

* Suppressed loading around zero (< 0.30)

To illuminate the difference between the response patterns of the participating groups, we used the summarised *root mean square coefficient* (Harman, 1967, 209). Notice that correlation is a weaker measure of relative distance between mean values than the root mean square coefficient. A comparison between the Swedish gymnasium students and the Danish university students indicated a remarkable closeness, the measure for Factor I being (d_{SDI} = .30) and for Factor II (d_{SDII} = .99). The Danish gymnasium students and the Danish university students are likewise close in responsiveness to Factor I, this measure being (d_{DDI} = .21). However, their distance is substantial with respect to Factor II, where the measure is (d_{DDII} = 2.83).

For the first time in twenty years, a test result is negative: it indicates that this particular group was incapable of distinguishing between the different model societies. For these gymnasium students, life quality is neither perceivable as growth in eigen-value nor associated with differences in social texture. Thus, for this group, visible social texture was negatively valued and consequently not the primary carrier of information for competent behaviour. The nature of this group's involvement with the model societies determined competence negatively. This makes evident their incapacity of perceptual identification with growth in eigen-value.

In order to discover what impact the respective source of variations has on the variance, a factor analysis of the discriminations is necessary; this means investigating the relationship between the score achieved for one specific factor and the score in the test as a whole. For this purpose a *multivariate analysis of variance* (MANOVA) was carried out (Table 2). The characteristic property of MANOVA is that the dependent variables (Factor I and Factor II) are combined to a new composite variable (the discriminant function), which can be treated like a vector. This vector is shown to have a multivariate and approximately normal distribution. This is documented by means of the Anderson-Darling normal probability plot (Minitab inc., 1996). The further discussion will primarily be based on the *effect size index* (η^2), a measure of percentage of variance accounted for by a single factor (Table 2).

Table 2.

A multivariate analysis of variance, MANOVA

Factor	**Levels**	**Values**			
Environment	2	Denmark	Sweden		
Model	4	Behaviour	Humanist	Growth	DK/ SWE
Group	4	DK-gym	DK-uni	SWE-gym1	SWE-gym2
Factor	2	Eigen-value	Social Texture		

Source	**DF**	**Seq. SS**	**Adj. SS**	**Adj. MS**	**F**	**P**	η^2
Environment	1	2277.2	0.3	0.3	0.05	0.828	0.000
Model	3	47.0	47.0	15.7	2.81	0.039	0.004
Group	3	6593.0	6593.0	2197.7	393.9	0.000	0.516
Test-vector	1	348.1	348.1	348.1	21.81	0.000	0.027
Error	631	3520.8	3520.8	5.6			
Total	639	12786.1					

The P-values measure the likelihood of the variance being caused by coincidence. The root of this index is a measure on the *point-biserial correlation* between the scales and the function of discrimination (Ferguson, 1966).

We expected the environment to account for a part of the variance in the distribution of factors. From a mental or *ego-motional* point of view, the study of competence means searching for information carried by *eigen-value* and *visibility of social texture*, but the milieu or atmosphere of the environment is conceived as a medium that reflects this information. In detecting this information, the individual guides and controls its movements. However as shown in Table 2, the environments as a factor of significance did not become manifest; there is no noticeable correlation between the country from which the students came and the variance in the distribution of factors. Our conclusion is that the conception of specific environmental structures accounts for nothing.

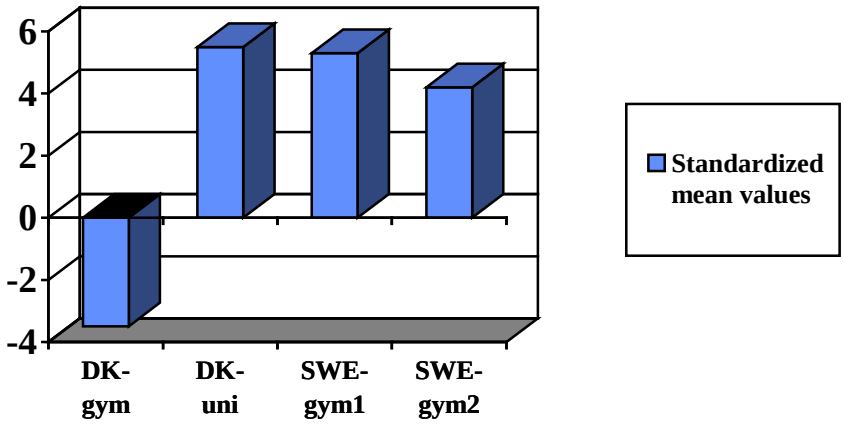
The amount of variance associated with the factors of competence (FI and FII in the form of the test vector) can be bypassed, because the correlation is negligible ($r_{pb} = 0.16$), explaining only 3% of variance. Even though there is no correlation, the combination of *eigen-value* with *visibility of social texture* in the form of a test vector helps to comprehend the individual's general outlook towards success and competition.

In examining Figure 1, a strong demarcation line can be drawn concerning perceptual competence in extracting an affordance, the profoundly significant result is that the Danish gymnasium students deviated from all the other groups.

The results of the MANOVA indicate that the model societies were of no import as sources of variation: they account for only 0.4% of the variance in the data set. This is an unexpected result, that the models as source of variation had only negligible effects on the individual's pick up and transformation of information. In previous studies of the process of transformation, the model societies have served as a key to understanding perceptual and behavioural processes as well as to the establishment of mental invariants (B. Bierschenk, 1997b).

Figure 1.

Levels of competence



The examination of variance ends with the result that 52% of explainable variance is preserved through the integration of experience. This means that the variance is dependent on the individual's continuous transformations on the basis of his or her experiential background and subsequent cognitive development. *The conclusion is, that the overwhelming effect is associated with the individual as a factor of discrimination.*

Discussion

In order to act competently and thereby establish a basis for the attainment of life quality, the participating Danish students must learn to discriminate between objects and events that have moved or changed. Thus, acting with competence is different from acting according to *qualifications*. The difference is attributable to the fact that competence requires the individual to detect structural and transformational invariants and to specify their nature in the form of changes in judgement. To manifest competence in the present context, the individual must be able to observe structural unity and indicate this by identification with those structures. Changes in identification depend on the student's *ego-motion* referring to the hinge on the specific statements e.g. "I can choose..." or "I am able to...".

In confronting different types of students, living in different types of environments, with novel situations, implies that familiar ways of making preferential judgements (qualification thinking) may be inefficient means for proper adaptation to the projected model societies. The participants in this study were supposed to handle evolving flows of information on the basis of perceptual adaptation to developing sequences of events. Evidently, the kind of incompetence demonstrated is of most fundamental concern to society, because it makes explicit the reciprocal nature of competence development and development of life quality. From a global point of view, a study of possible disparity in the way information concerning civilisation is picked up and cognitively integrated, draws attention to the viewer’s potential to co-ordinate his or hers prospect of consequences of behaviour with behavioural control.

Finally, through demonstrative definitions of perceived possibilities, it has been shown that the individual as a factor of variation is the only important one: the individual accounts for the variability in and between experimental conditions. Staging perceptual development and judgement of appropriate behavioural strategies with reference to a given model society has made it clear, that the development of judgement needs to be embedded in the context of a particular civilisation.

Overview and perspectivation of one's survival conditions implies a departure from specialised models. Therefore, the present paper is intended to give an account of the perception and interaction with differently founded societies. The reported experiments cover a period of about 15 years and are stressing the contributions that apparent disparate systems can make to the co-operation of the individual's experience with various physical and social surroundings and the cognitive integration an individual can achieve. At the beginning, the experiments were designed with explicit reference to James J. Gibson's theory of ecological perception. Later on, the aims have been extended with the purpose of approaching interactive information processing within the framework of the theories of discontinuity. As will be outlined by Ole Elstrup Rasmussen, University of Copenhagen, this extension has been successful which allows the statement that the Gibsonian concepts of "shallow" and "deep" have been projected into the instructional materials used in our studies. By means of a fairly extensive statistical program all studies have been put together in order to achieve a longitudinal evaluation of the preferences shown by a broad spectrum of participants. Based on the two established factors, their factor-scores were used in the set-up of two test-vectors, for input in a number of discrimination analyses. This measure allowed a location of the environments in the measurement space in terms of centroids that were discriminated efficiently in all studies carried out thus far. The test-vectors correlate mainly with the first discrimination function. This function accounts in all cases for between 60% and 80% of the variance in the scales.

References

Bierschenk, B. (1987). Perception of quality of life. *Cognitive Science Research*, 16. Lund: Lund University. (ERIC, No. ED 282 892, TM 870 265).

Bierschenk, B. (1988a). The visual cliff transformed. A factor-analytic definition *Cognitive Science Research*, 25). Lund: Lund University. (ERIC, No. ED 340 712, TM 013 836)

Bierschenk, B. (1988b). A theoretical basis for estimating quality of life. *European Journal of Political Economy*, *4*, 323-332.

Bierschenk, B. (1993). The tacitness of Tacitus. A methodological approach to European thought. *Cognitive Science Research*, 46. Lund: Lund University. (ERIC, No. ED 388 038, FL 023 276) (PsycINFO, AN: 80-32773)

Bierschenk, B. (1997a). Informational interaction with model-societies of different theoretical Orientation. *Cognitive Science Research*, 63. Lund: Lund University, Department of Psychology.

Bierschenk, B. (1997b). *A topometric approach to life quality across comparted time and projected societies.* Copenhagen: Copenhagen University, Copenhagen Competence Research Centre. (Unpublished manuscript.)

Bierschenk, B., & Bierschenk, I. (1987). Consciousness as a function of knowledge and culture. *Cognitive Science Research*, 18). Lund, Sweden: Lund University. (ERIC, No. ED 290 634, SO 018 045)

Bierschenk, I. (1997). Discovery of competence at the edge of literature and society. *Cognitive Science Research*, 64). Copenhagen: Copenhagen University, Copenhagen Competence Research Centre & Lund University, Department of Psychology.

Elstrup Rasmussen, O. (1997). *Putting Quality of Life to a Test*. Copenhagen: Copenhagen University, Copenhagen Competence Research Centre. (Unpublished manuscript)

Ferguson, G. A. (1966). *Statistical analysis in psychology and education*. McGraw-Hill. (Original work published 1959)

Ghiselin, M. T. (1981). Categories, life and thinking. *Behavioural and Brain Sciences*, *4*, 269-313.

Harman, H. H. (1967). *Modern factor analysis* (Rev. ed.). Chicago: University of Chicago Press.

Lee, A. E., & Mayer, W. V. (1976). *The Program Guide to Projections for the Future*. Boulder, CO: Biological Science Curriculum Study.

Minitab Inc. (1996). *Minitab reference manual*. State College, PA: Minitab.

Royce, R. J., & Mos, L. P. (1979). Theoretical advances in behaviour genetics. Alphen aan den Rijn: Sijthoff & Noordhoff.

Authors' Note

The study has been carried out as a co-operative project by Lund University, Sweden, and the University of Copenhagen, Denmark: Copenhagen Competence Research Centre (CCRC) the latter organisationally associated with the Psychological Laboratory.

We would like to thank Inger Bierschenk for the collection of data from the Swedish samples. Likewise, we convey our gratitude to Mette Avnshoj for carrying out the collection of data from the Danish gymnasium students. Our gratitude also goes to Ole Elstrup Rasmussen, who carried out the data collection from the Danish University students.

The present article has been prepared with financial support from the Danish Research Councils.

Correspondence concerning this article should be addressed to Bernhard Bierschenk at the Copenhagen Competence Research Centre, Copenhagen University, Njalsgade 88, Dk-2300 Copenhagen S, Denmark. Electronic mail may be sent via Internet to bernhard@axp.psl.ku.dk.